dred and fifty-one stations show 4,510 observations to have been made, of which five were reported doubtful; of the remainder, 4,605, there were 3,844, or 83.5 per cent., followed by the expected weather.

WATER-SPOUTS.

The steamship "Clement," Thomas Burley, commanding, reports: in N. 19° 29′, W. 59° 14′, at 22 h. 26 m., Greenwich mean time of June 4th, saw three large water-spouts, moving in a ssw. direction.

Steamship "Stroma," reports: June 4th, in N. 32° 38′, W. 75° 35′, passed two water-spouts to the westward, one of which rushed in close proximity to the vessel.

Indianola, Texas: on the 8th a water-spout passed over Powder Horn Lake, a small body of water lying west of the town.

VERIFICATIONS.

INDICATIONS.

In the table below are shown the percentages of indications verified for the months July to October, 1885, inclusive. The percentages for July and August, 1885, as published in the MONTHLY WEATHER REVIEW for those months, have been revised, with results as given in this table. The percentages for October and November, 1885, have not been published previously. The indications for July, eighteen days of August, and for September were verified by 2d Lieutenants Joseph S. Powell and J. E. Maxfield, Signal Corps, U. S. Army, Assistants, and Prof. Cleveland Abbe, Assistant; the remaining thirteen days of August were verified by 1st Lieut. H. H. C. Dunwoody, 4th Artillery, Acting Signal Officer and Assistant, 2d Lieut. W. A. Glassford, Signal Corps, U. S. Army, Assistant, and Prof. Cleveland Abbe, Assistant. The indications for October were verified by 1st Lieut. T. M. Woodruff, 5th Infantry, Acting Signal Officer and Assistant, and 2d Lieut. W. A. Glassford, Signal Corps, U. S. Army, Assistant:

Percentages of indications verified—July to October, 1885.

	July.	August.	September.	October.
By districts:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
New England	68.58	72.79	82.24	75.84
Middle Atlantic states	74.01	73.80	80.60	79.85
South Atlantic states	79.39	70.51	83.97	88.35
East Gulf states	83.27	75.80	80.72	84.65
West Gulf states	80.95	73.56	81.72	81.75
Lower lake region	70.89	75.00	76.15	77.43
Upper lake region	73.53	72.57	75.07	74.13
Tennessee and Ohio Valley	72.84	74.55	75.49	80.42
Upper Mississippi valley	73.01	76.32	76.45	77.54
Missouri Valley	71.60	70.65	73.06	77.52
North Pacific coast region	88.45	91.37	82.59	66.95
Middle Pacific coast region	92.69	91.23	89.73	80.75
South Pacific coast region	95.47	93.57	93.60	91.38
By elements:				
Weather	78.56	79.84	86.61	84.53
Wind	74.59	70.30	75.52	77.11
Temperature	78.86	80.00	77.22	75.66
Barometer	82.78	87.68	81.51	81.59
General averages	77.44	76.90	79.95	79.69

The detailed comparison of the tri-daily indications for June, 1886, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 73.07. The percentages for the different elements are: Weather, 77.71; wind, 67.66; temperature, 73.86. By states, etc., the percentages are: For Maine, 67.22; New Hampshire, 67.50; Vermont, 67.13; Massachusetts, 67.69; Rhode Island, 69.54; Connecticut, 70.74; New York, 75.37; Pennsylvania, 73.15; New Jersey, 77.96; Delaware, 78.52; Maryland, 77.59; Virginia, 77.69; North Carolina, 75.28; South Carolina, 76.11; Georgia, 78.61; Florida, 69.17; Alabama, 76.57; Mississippi, 78.52; Louisiana, 76.11; Texas, 77.59; Arkansas, 73.33; Tennessee, 76.76; Kentucky, 70.65; Ohio, 73.70; West Virginia, 65.19; Indiana, 70.83; Illinois, 73.13; Michigan, 73.41; Wisconsin, 70.09; Minnesota, 70.00; Iowa, 66.02; Kansas, 69.91; Nebraska, 71.67; Missouri, 72.86; Colorado, 78.89; east Dakota, 72.99; north Pacific coast region, 68.75; middle Pacific coast region, 79.76; south Pacific coast region, 81.99.

There were eight omissions to predict, out of 9,864, or 0.01 per cent. Of the 9,856 predictions that have been made, eight hundred and ninety-six, or 9.09 per cent., are considered to have entirely failed; five hundred and ninety-four, or 6.03 per cent., were one-fourth verified; 1,893, or 19.21 per cent., were one-half verified; 1,463, or 14.84 per cent., were three-fourths verified; 5,010, or 50.83 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During June, 1886, there were fifty-nine signals of various kinds ordered, of which number, eleven, or 20.34 per cent., were fully justified both as to direction and velocity. Of the signals above mentioned twenty-one were ordered for northeasterly winds; of these, four, or 19.05 per cent., were justified both as to direction and velocity, and twelve, or 57.14 per cent., were justified as to velocity only. Sixteen signals were ordered for southeasterly winds, and two, or 12.50 per cent., were justified both as to direction and velocity. Seven signals were ordered for southwesterly winds, and three, or 42.86 per cent., were justified both as to direction and velocity. Thirteen signals were ordered for northwesterly winds; of these, two, or 15.38 per cent., were justified both as to direction and velocity, and three, or 23.08 per cent., were justified as to velocity only. Two cautionary signals were ordered (for no specified direction) and neither was justified.

In twenty-two cases winds were reported which would have justified signals had they been displayed.

COLD-WAVE SIGNALS.

No cold-wave signals were ordered during June.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for June, 1886, states:

The verifications of predictions for the whole area was 93 per cent. for temperature, and 87 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus and Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; and the cities of Milledgeville, Georgia, and Talladega, Alabama.

LOCAL WEATHER SIGNALS.

Prof. Winslow Upton, director of the "New England Meteorological Society," in the report for June, 1886, states:

The verification of weather signals at New Haven was 83 per cent. for temperature, 93 for weather; at fourteen other stations reporting to the secretary, 92.3 for temperature, 83.5 for weather. Local predictions made at Blue Hill gave 70 per cent. for rains, 90 for weather.

Prof. Goodwin D. Swezey, director of the "Nebraska Weather Service," in the report for June, 1886, makes the percentage of verifications for temperature in the state 86.7, and weather 82.7.

Meteorological record of voluntary observers and Army post surgeons, June, 1886.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.	Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Alabama.	°	°	°	*Inches*	*California*—Cont'd.	°		°	*Inches*
Birmingham *	92	60	76.0	7.08	Cahuenga				0.00
Greensborough	88	66	76.0	6.73	Gaston, Fort	98	43	67.4	0.00
Mount Vernon B'ks	96	63	76.8	7.41	Hydesville				0.00
Arizona.					Mason, Fort	76	53	62.3	0.00
Huachuca, Fort	101	47	76.0	0.00	Murietta *	98	48	65.0	0.00
Lowell, Fort	110	52	86.7	0.00	Nicolaus *	100	58	75.4	0.00
McDowell, Fort	113	52	88.6	0.00	Oakland	79	53	66.8	0.00
Arkansas.					Oroville *	95	62	79.1	0.00
Lead Hill *	101	52	75.4	5.43	Poway *	95	60	67.2	0.00
California.					Presidio of San F	77	45	57.0	0.00
Alcatraz Island	72	48	56.0	0.00	Princeton *	103	51	73.4	0.00
Angel Island	93	51	63.8	0.00	Sacramento *	99	51	72.3	trace.
Benicia Barracks	86	55	67.9	0.00	Salinas	71	51	57.0	0.00
Bidwell, Fort	92	33	65.3	0.78	Susanville	93	47	66.0	1.22

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Colorado.	°	°	°	*Inches*
Colorado Springs	85	45	64.4	3.06
Lewis, Fort	86	36	61.7	0.32
Connecticut.				
Bethel				2.51
Hartford	85	42	63.1	1.97
North Colebrook *	78	43	59.0	1.19
Voluntown	83	54		1.65
Dakota.				
Abr. Lincoln, Fort	96	41	66.8	2.20
Meade, Fort	95	45	67.1	0.90
Pembina, Fort	91	26	63.3	3.66
Randall, Fort	99	37	69.5	2.62
Richardton	88	48	68.9	2.86
Sisseton, Fort	88	36	65.2	2.72
Sully, Fort	100	44	70.5	4.29
Totten, Fort	90	35	64.7	3.14
Vermillion	91	40		2.55
Webster	95	42	68.9	
Yates, Fort	96	41	68.4	2.20
District of Columbia.				
Distributing Res'r*	89	55	73.0	7.11
Receiving Res'v'r*	90	58	74.0	6.07
Rock Creek Bridge*	94	56	74.8	
Florida.				
Alva*	93	68	76.6	11.40
Archer *	92	66	79.8	12.55
Limona *	102	69	80.3	11.65
Manatee *	96	70	83.1	11.14
Meade, Fort				6.80
Merritt's Island	93	42	79.0	6.70
St. Augustine, Fort	94	66	78.8	4.67
Tallahassee *	92	72		7.75
Georgia.				
Athens	87	60	73.4	9.08
Forsyth *	91	66	76.4	11.14
Milledgeville	94	64	77.9	10.97
Idaho.				
Boisé Barracks	99	40	71.9	0.32
Cœur d'Alene, Fort	88	38	63.4	1.51
Illinois.				
Anna *	93	53	73.7	3.84
Bloomington	88	49		3.71
Collinsville	89	42	70.9	6.55
Charleston*	92	41	71.5	2.09
Geneseo *	89	43	73.6	0.54
Mattoon *	94	56	73.0	3.97
Pekin *	95	47	73.5	1.99
Peoria	95	48	74.2	3.67
Riley	89	42	65.5	1.89
Rockford*	88	50	67.2	2.74
Sandwich	92	49	68.8	1.28
South Evanston	89	40	64.8	1.30
Sycamore	88	52	66.2	2.27
Windsor	95	48	72.7	6.59
Indian Territory.				
Gibson, Fort	99	54	74.6	3.00
Reno, Fort	101	48	74.8	2.86
Supply, Fort	98	48	73.7	3.54
Indiana.				
Butlerville *	90	52	73.4	8.51
Fort Wayne*	92	45	69.6	6.00
Connersville*	88	55	68.3	5.53
Jeffersonville	90	50	71.8	5.14
Laconia	95	47	72.5	5.36
Lafayette	93	39	68.9	2.90
La Grange	88	42	66.7	4.56
Logansport*	92	44	72.2	4.45
Mauzy	88	37	66.9	8.34
Monticello	89	48	68.8	
Spiceland	93	42	67.5	6.01
Sunman*	87	46	71.3	6.68
Terre Haute*	85	56		2.36
Vevay	86	51	70.5	7.39
Iowa.				
Bancroft	95	40	66.4	1.32
Cedar Rapids *a*	94	43	71.1	1.25
Cedar Rapids *b* *	93	34	63.4	
Corydon	93	55	71.9	0.90
Des Moines	96	40	68.7	
Independence *	88	52	69.0	1.69
Logan	98	40	70.7	3.30
Fort Madison	93	50		0.85
Manchester*	90	42	68.0	1.54
Monticello *	95	36	68.9	1.41
Mount Vernon*	98	48	73.2	
Oskaloosa *a*	98	44	72.2	0.62
Oskaloosa *b* *	93	50		
West Union *	95	46	66.8	1.77
Kansas.				
Allison	96	54	72.1	6.39
Atchison *	93	54	71.9	3.05
Belleville	94	65	81.0	1.68
El Dorado	92	48	71.1	3.70
Elk Falls				3.59
Hays, Fort	98	43	69.7	3.60
Independence *	96	54	72.9	2.23
Lawrence	92	49	71.8	3.71
Manhattan	100	55	72.3	5.40
Minnescah	95	57	74.1	7.61
Riley, Fort	100	47	76.0	2.98
Fort Scott*	98	56	75.5	3.99
Sterling	95	54	71.5	5.63
Kansas—Cont'd.	°	°	°	*Inches*
Topeka	96	54	71.1	4.03
Wakefield *	99	54	73.5	4.12
Wellington	91	54	71.2	7.71
Westmoreland*	96	43	73.0	3.37
Wyandotte	94	46	70.0	4.20
Kentucky.				
Frankfort	89	49	71.8	5.01
Louisiana.				
Grand Coteau	92	69	78.7	11.31
Liberty Hill	90	77	85.5	6.26
Luling *	92	67		4.11
Maine.				
Bar Harbor	78	45		1.75
Buckfield *				1.71
Cornish *	85	51	62.9	2.19
Gardiner	81	44	61.1	1.84
Orono *	83	46	61.6	2.74
Maryland.				
Cumberland	82	45	67.2	4.02
Fallston*	86	51	66.8	5.25
Great Falls*	88	57	71.8	4.98
McDonogh	85	51	69.1	4.01
McHenry, Fort	85	54		6.08
Woodstock	87	44	67.9	4.54
Massachusetts.				
Amherst *a*	82	51	63.5	1.80
Amherst *b*	82	42	63.2	2.33
Blue Hill Obs'y	81	48	61.1	1.52
Deerfield	88	40	63.4	
Dudley	86	49	64.0	1.29
Fall River	80	50	63.3	1.38
Heath *	84	42		
Milton	82	50	61.9	1.56
New Bedford	79	45	62.8	2.08
Princeton	79	45	60.9	1.86
Quincy*	83	43	72.6	1.70
Somerset *	89	50	67.6	1.29
Taunton	85	40	64.0	1.23
Worcester	77	52	61.1	2.15
Westborough	86	41	65.7	1.63
Williamstown	76	42	62.3	2.72
Michigan.				
Birmingham	89	41		1.82
Brady, Fort	86	33	58.8	3.12
Harrisville *	85	33		5.01
Hudson	95	37		3.48
Kalamazoo	88	46		2.98
Lansing	91	40	66.2	2.14
Mottville				1.75
Pentwater	93	27	59.2	0.44
Thornville	92	44	66.8	1.92
Traverse City *	90	34		0.97
Minnesota.				
Minneapolis	91	48	66.5	5.35
Snelling, Fort	94	41	67.4	4.52
Missouri.				
Carthage	98	51	75.6	5.60
Central College*	93	49	73.1	5.40
Conception *	89	50	71.1	2.12
Pierce City	93	50	71.1	7.40
Warrenton *	90	56	72.1	
Montana.				
Assiniboine, Fort	94	48	68.7	0.86
Ellis, Fort	67	32	61.8	2.83
Keogh, Fort	101	41	71.3	2.28
Missoula, Fort	86	43	62.4	1.58
Shaw, Fort	91	36	65.2	1.64
Nebraska.				
Brownville	93	49	70.1	
Crete	90	42	68.7	6.10
De Soto *	95	40	71.9	1.02
Fairbury	97			3.97
Fremont *	94	44	69.0	2.89
Genoa	92	42	69.3	3.24
Hay Springs *		33	63.9	2.66
Marquette				2.23
Niobrara, Fort	99	42	69.4	2.04
Robinson, Fort	92	41	67.7	1.91
Sidney, Fort	93	39	64.6	0.52
Stockham	92			3.55
Nevada.				
Halleck, Fort	92	31	62.4	0.38
McDermit, Fort	95	33	65.2	0.82
New Hampshire.				
Antrim				3.05
Ashland				2.77
Belmont				2.67
Berlin Mills	91	32		1.38
Bristol				2.70
Hanover	82	50		2.44
Lake Village				2.33
Nashua	85	41	63.5	1.79
Wier's Bridge				2.38
Wolfborough				2.70
Woodstock				2.30
New Jersey.				
Beverly *	90	52	67.8	3.83
Clayton *	91	47	67.3	2.32
Dover *	83	41	64.6	2.54
Egg Harbor City	90	40	66.9	5.79
Phillipsburg				3.31
Readington*	88	58	71.2	

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean	Rainfall.
New Jersey—Cont'd.	°	°	°	*Inches*
Roseland				3.91
South Orange	86	56	65.4	2.50
Upper Montclair	80	48	64.4	5.17
Vineland	86	55	70.0	2.28
New Mexico.				
Bayard, Fort	96	52	73.8	1.16
Gallinas Spring	95	51		5.04
Puerto de Luna	94	56	71.7	1.09
Union, Fort	90	41	65.8	1.66
Selden, Fort	107	55	80.5	0.62
Wingate, Fort	92	42	67.9	0 34
New York.				
Auburn	71	54	63.6	3.53
Columbus, Fort	83	51	65.7	3.24
Cooperstown *	79	44	60.8	3.01
David's Island	82	49	65.2	2.82
Factoryville*	88	42	65.1	1.87
Humphrey *	90	47	61.1	2.76
Ithaca	90	41	65.5	2.28
Madison Barracks	84	42	64.5	1.08
Menand Station	80	56	65.3	2.39
Mountainville	82	41	63.9	2.91
Niagara, Fort	84	42	63.4	1.67
North Volney *	85	49	63.3	
Palermo *	82	46	61.7	3.44
Palmyra *	90	51	68.1	
Penn Yan				2.40
Plattsburg B'ks	84	46	63.2	4.72
Setauket	80	49	63.8	3.72
Syracuse	81	50		
West Point	84	45	66.9	3.00
White Plains	78	54	65.8	4.12
North Carolina.				
Chapel Hill	93	54	75.3	6.22
Lenoir	84	57		8.00
Lincolnton	85	60	70.6	8.43
Raleigh	91	63	75.0	4.80
Reidsville *	97	38	66.4	8.88
Statesville*	91	61	73.0	6.26
Weldon *	94	61	73.2	6.75
Ohio.				
Cleveland	90	44	65.8	1.22
Clyde	92	59	71.6	1.50
College Hill *	97	54	72.0	7.75
Elyria	89	46		2.64
Fostoria *	93	49	68.8	3.08
Garrettsville	89	33	61.4	2.35
Hiram	86	47	65.2	2.58
Jacksonborough*	94	48	67.4	6.25
Napoleon	91	43	69.3	1.05
North Lewisburg	93	44	69.8	1.05
Portsmouth	86	50	68 8	6.75
Ruggles*	88	42	67.2	1.45
Tiffin *	92	44	67.7	1.01
West Milton	94	46	70.0	8.00
Wauseon	95	36	67.4	2.01
Westerville	88	40	66.4	2.11
Yellow Springs	84	43	66.9	4.54
Oregon.				
Albany*	91	54	63.5	0.36
Bandon*	70	47	55.1	0.51
East Portland *	92	50		0.04
Eola *	83	50	61.5	0.58
Gardiner *	84	46		
Klamath, Fort	85	23	58.6	1.11
La Grange	90	42		0.52
Mount Angel*	90	52	65.3	4.36
Pennsylvania.				
Bethlehem *	83	43	69.0	4.53
Blooming Grove *	89	48	61.9	3.20
Catawissa *	86	44	65.2	3.08
Drifton	80	32	62.0	2.60
Dyberry	86	38	62.4	1.21
Easton				3.93
Fallsington	82	56	66.0	2.90
Franklin *	86	36	59.5	4.33
Germantown*	81	54		
Pennsylvania—Con.	°	°		*Inches*
Grampian Hills*	86	44	65.8	4.93
Mahanoy Plane	86	60	72.8	5.23
Philipsburg *	83	49	66.1	5.70
Quakertown	77	40	62.8	5.06
Troy *†	80	42	60.3	2.97
Wellsborough *	86	45	65.2	2.01
West Chester	86	50	66.4	4.30
Wilkesbarre	90	41	65.6	2.95
Wyox	84	50	67.1	2.60
Zionsville	86	50	70.3	4.58
South Carolina.				
Kirkwood *	85	67	70.4	7.07
Pacolet	83	64	73.4	9.20
Spartanburg	86	60	67.4	11.60
Stateburg *	90	62	75.0	5.35
Tennessee.				
Ashwood	89	58	73.5	5.20
Austin	92	60	74.8	7.37
Milan	90	56	72.8	4.84
Paris *	90	64	70.7	
Texas.				
Austin *	102	67	83.0	0.92
Cleburne	98	59	77.2	2.18
Comfort				1.88
Concho, Fort	112	60	84.0	1.60
Corsicana				3.94
Midland	103	60	80.6	1.42
McIntosh, Fort	104	63	86.1	4.64
Ringgold, Fort	110	57	87.7	2.08
New Ulm	102	60	81.7	0.68
Silver Falls	104	64	81.0	1.07
Vermont.				
Brattleborough	85	40	64.6	2.25
Burlington	82	45	67.0	1.98
Charlotte*	82	50	64.5	5.40
Lunenburg	78	40	59.9	1.70
Newport*	84	43	62.9	4.55
Post Mills*	84	42	63.0	1.50
Poultney	85	40	62.4	3.31
Strafford *	80	46	63.9	2.20
Virginia.				
Accotink	94	58	71.7	5.93
Bird's Nest*	97	62	74.4	6.40
Bruington				7.28
Dale Enterprise*	92	52	72.3	8.63
Marion	83	54	67.2	7.80
Monroe, Fort	89	59	72.2	7.20
Summit	90	46	69.4	
University of Va	80	62	70.7	7.33
Variety Mills	88	48	69.5	6.21
Wytheville	85	48	67.4	4.59
Washington Territory.				
Bainbridge Island *	90	46	62.3	0.41
Spokane, Fort	98	41	68.2	0.46
Tacoma *	83	47	60.7	1.03
Townsend, Fort	81	41	60.4	0.24
Walla Walla, Fort	93	43	70.7	0.56
West Virginia.				
Clarksburg	98	40	71.2	4.20
Helvetia*	86	42	65.1	5.46
Parkersburg	87	46	68.0	5.31
Wisconsin.				
Beloit	91	42	66.0	2.96
Embarrass *	92	48	67.1	4.50
Fond du Lac *	93	31	66.0	1.56
Madison	94	44	67.5	1.08
Manitowoc	85	36	61.7	3.88
Neillsville *	91	25	57.4	2.55
Prairie du Chien	95	53	69.2	2.17
Wausau	90	33	63.4	2.55
Wyoming.				
Bridger, Fort	87	26	63.2	0.30
Fred Steele, Fort	93	33	65.3	0.04
Laramie, Fort	90	39	66.7	0.91
Washakie, Fort	90	38	64.4	2.46

† Observation taken at Mount Pisgah, near Troy.

NOTES AND EXTRACTS.

The following is an extract from the June, 1886, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn:

The month has been noted on account of the large per cent. of rain that fell and the few number of fair and clear days. The rains have been almost continuous for an average of eighteen days, and the crops are reported as being in very bad condition. Corn and cotton have been so badly choked with grass and weeds that much of the growth of the plants has been retarded and considerable damage is the result. Oats were injured very much in being harvested. The almost incessant rains and the many cloudy days prevented that amount of sunshine so necessary for the curing of oats, and much of this crop will be lost on the field. A small crop of corn will be made on the bottoms, and the melon and fruit crops have been seriously damaged by rotting and falling off, and in some sections the melon vines have been injured by mould

and other forms of fungi. The precipitation was 3.84 inches above the normal.

State summary.

Temperature.—Mean temperature, 75°.8; highest temperature, 97°, at Union Springs, on the 11th; lowest temperature, 52°, at Gadsden, on the 19th; range of temperature, 45°; greatest monthly range of temperature, 42°, at Gadsden; least monthly range of temperature, 19°, at Owischee; mean daily range, 13°; greatest daily range of temperature, 32°, at Gadsden, on the 26th; least daily range of temperature, 0°, at Valley Head, on the 27th.

Precipitation.—Mean depth of rainfall, 8.74 inches; mean daily rainfall, 0.291; greatest depth of monthly rainfall, 12.41 inches, at Lineville; least depth of monthly rainfall, 5.49 inches, at Mobile; greatest daily rainfall average for state, 0.97 inch, on the 23d; greatest daily local rainfall, 4.42 inches, at Evergreen, on the 9th.

Average number of days on which rain fell, 17; average number of cloudy days, 16; average number of fair days, 9; average number of clear days, 5.

Warmest days, 2d, 3d, and 12th; coldest days, 4th, 19th, 21st, and 22d.

Prevailing direction of wind, southeast.

Chattanooga reports that the greatest velocity of wind was twenty-two miles per hour from the north; Mobile, twenty-two miles from the southeast, and Montgomery, thirty-two miles from the west.

The following is an extract from the June, 1886, "Bulletin of the Colorado Meteorological Association," under direction of Prof. F. H. Loud, of Colorado College, Colorado Springs:

The weather of June, 1886.

The weather of the month may be described under three periods: the first extending from June 1st to 9th; the second including the week from June 10th to 16th, inclusive; and the third comprising the remainder of the month. During the first period there was first a barometric rise, lasting from two to four days at different stations, then a decline of no great magnitude, and finally a rise to a second maximum, which terminated the period. The weather was, in general, cool, and showers were frequent. The first and second days were dates of the most important rainfall of the month, which appears to have been confined to the eastern slope of the continental divide. During the second period the barometer descended to the monthly minimum on the 12th, and rose during the four days following. There was no rainfall reported from the western slope, and only local and moderate showers on the eastern side. The 13th and adjacent days were remarkably clear. The temperature of the week was high, declining near the close. The weather of the third period was quite local in character. The oscillations of the barometer were slight, the lowest daily mean, on the 24th, being generally higher by more than two-tenths of an inch than that of the 12th. The precipitation was all, or almost all, in the form of thunder showers of small area, some of these, in the northern and northeastern parts of the state, were accompanied by violent hail, doing damage to crops which has been estimated to reach a quarter of a million dollars. The temperature was moderate at the beginning of the period, but exhibited a decided increase toward the end of the month.

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The association solicits the aid of all persons in Colorado who are interested in the subject of meteorology. Those who are willing to take observations are requested to address the director, who will also welcome any suggestions looking to increased efficiency of the weather service. On the subject of membership the secretary of the association, Dr. S. A. Fisk, may be addressed at 373 Curtis street, Denver.

The following meteorological summary and notes, for June, 1886, are from the Georgia "Crop Report," prepared under direction of Hon. J. T. Henderson, Commissioner of Agriculture for Georgia:

Districts.	Temperature.			Rainfall.	
	Maximum.	Minimum.	Mean.	Average amount.	Average No. days.
	°	°	°	*Inches.*	
Northern Georgia	89.0	60.0	73.2	7.85	14
Middle Georgia	91.0	63.0	75.5	9.64	14
Southwestern Georgia	92.0	69.0	79.9	12.13	12
Eastern Georgia	90.0	64.0	76.5	10.17	12
Southeastern Georgia	94.0	71.0	80.8	6.82	10
Means for state	91.2	65.4	77.2	9.34	12

Temperature and rainfall.

The mean temperature of the spring, and thus far of the summer months, has been much lower than what is usual for the time of year, and the amount of rain for the same time very much greater. The average amount of rainfall for the month of June in the state is 9.32 inches, being 5.32 inches in excess of the average for June, as determined from past observations. There was an average of fourteen rainy days in north and middle Georgia, and at some places as many as twenty. In southern Georgia the precipitation was somewhat heavier, but the rainy weather was not altogether so continuous. At Americus there was the large total rainfall during the month of 16 inches.

The following meteorological summary and accompanying remarks are from the June, 1886, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
	°	°	°	*Inches.*
Northern counties	93.0	42.0	68.1	3.55
Central counties	93.0	37.0	68.2	5.46
Southern counties	94.0	48.0	70.9	7.21
State	94.0	37.0	69.1	5.41

Temperature.—The mean temperature of the state for June, 1886, was 1°.2 below the mean of June for the past four years; 3°.0 below the mean of sixteen years at Indianapolis; 4°.8 below the mean of thirty-one years at Logansport; 5°.0 below the mean of twenty-one years at Vevay; 1°.4 below the mean of thirty-two years at Spiceland; 3°.0 above the mean of seven years at Mauzy; 2°.7 below the mean of nine years at Blue Lick; 3°.5 below the mean of four years at Worthington; 0°.5 below the mean of four years at Connersville; 0°.7 below the mean of seven years at Lafayette; and about 3°.4 below the normal temperature for June. The mean temperature at the various stations was below the normal, the amounts ranging from 0°.9 to 3°.5.

Rainfall (inches).—The mean rainfall for the state was 0.85 above the mean of June for the past four years; 0.22 below the mean of fifteen years at Indianapolis; 1.48 above the mean of thirty-one years at Logansport; 0.53 above the mean of twenty-one years at Vevay; 0.67 above the mean of twenty-eight years at Spiceland; 0.01 below the mean of six years at Mauzy; 0.79 above the mean of four years at Blue Lick; 0.29 above the mean of four years at Worthington; 0.43 above the mean of four years at Connersville; and 0.25 below the mean of seven years at Lafayette. The rainfall has been unequally distributed throughout the state; at most stations it has been in excess of the normal, while at Indianapolis it was 0.71 below the normal, and at Lafayette 3.06 below. A severe hail storm did considerable damage near Connersville on the 25th.

The following summary for June, 1886, is from the report of the "Minnesota Weather Service," under direction of Prof. Wm. W. Payne, Carleton College, Northfield:

Temperature.—The average temperature of Minnesota for June, 1886, as deduced from reports received from the stations of the Minnesota Weather Service, is 65°.4; this is 6°.5 warmer than the preceding month of May, and 1°.3 warmer than the mean for June, 1885. The maximum heat was quite generally above 90°.0, the highest reading being 97°.0, at Spring Valley, on the 15th; and the lowest maximum, 86°.0, on the 11th and 14th, at Dodge Center. But one station reported the minimum temperature for the month as below 30°, 28°.0 being recorded at Grand Forks on the morning of the 5th, on which date frosts more or less injurious were general in the northwestern part of the state. The first decade of the month was dominated by cool and pleasant weather. From the 10th until the 15th a very warm wave prevailed in all sections except in the immediate vicinity of Lake Superior. The last half of the month was marked by moderately warm weather and a very even temperature, becoming gradually warmer as the end of the month approached.

Precipitation.—The precipitation has in general been less than the usual amount with a very decided deficiency in the southwestern part of the state, where continued drouth has been disastrous to the growing crops—so much so that estimates foreshadow but one-half of an average yield. The largest quantity recorded was 5.35 inches, at Duluth; the least, 1.89 inches, at La Crosse. During the first ten days of the month but little rain fell; the second decade was wet and the third dry, with only light local showers.

The following is an extract from the June, 1886, report of the "Missouri Weather Service," under direction of Prof. Francis E. Nipher, Washington University, Saint Louis:

Temperature.—June, 1886, has had an average temperature of 73°.8 at the central station, which is 0°.9 below the normal for Saint Louis. The lowest temperature observed during the month was 57°.5, on the 5th, and highest, 88°, on the 15th and 16th. The mean temperature for each decade was 71°.7 for the first, 76°.3 for the second, and 73°.3 for the third. The highest temperatures reported from the state were 101° at Pro Tem, Taney county, 96° at Greenfield, Miami, and Sedalia, and 95° at Louisiana and Mound City. Lowest temperatures observed were 42°, at Ironton; 44°, at Miami; and 45°, at Steelville and Mound City. Chamois reports the mean temperature of the past month as being 3°.2 below the normal of that place for the last thirteen years, and also an excess of rainfall of 3.89 inches.

Precipitation.—The rainfall was 7.26 inches, which is 1.78 above the normal for the central station. In the state the greatest rainfall was 8.41 inches at Sedalia, 7.66 inches at Chamois, 7.39 inches at Miami, and 6.75 inches at Laflin. Towards the north the fall was less than two inches, being 1.73 at Kirksville and 1.51 at Mound City.

The following is an extract from the June, 1886, "Bulletin of

the New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, Rhode Island:

Reports for the month were received from one hundred and forty-nine observers.

General conditions.—The month was an unusual month, because characterized by a deficiency in nearly all the usual conditions. The temperature was low, the rainfall meagre (except at a few stations), the pressure nearly normal, and there was an absence of severe local storms or high winds. The meteorological history of the month may be briefly given: on the 2d a cyclonic depression moved down the Saint Lawrence Valley, with general rains; this storm was noteworthy from the fact that the greater part of the rain fell after the centre had passed; cool, fair weather prevailed until the 12th, interrupted by light rains attending the easterly passage of two minor depressions north of the district, on the 7th and 9th, respectively. Partly cloudy skies, with occasional showers, prevailed from the 13th to the 18th, the pressure lingering below the normal west of New England, and finally developing into a cyclone which moved in the usual path north of the district on the 17th. Fair, cool weather prevailed until the 22d, when a second period of damp, cloudy weather, with frequent showers, remained until the 26th, resulting from the following barometric conditions: a cyclone moved from the Gulf northeasterly on the 22d, but lost its indenty on 23d in the Middle States, a large ill-defined area, with pressure a little below the normal, remaining in the central states for several days. A cyclone eventually formed in the Lake region, moving northeasterly, on the 25th. Fair, cool weather prevailed from the 27th to the 30th. It will be noted that all of the five depressions, whose attendant conditions modified the weather in New England, moved north of the district along the Saint Lawrence Valley, while the only depression which approached from the Gulf was dissipated before reaching New England.

Local storms.—The rains of the month, except that of the 3d instant, were chiefly in form of frequent showers, and the distribution of the rainfall was quite irregular. There was no general thunder-storm reported.

The condition of vegetation has been good, but the lack of rain threatens drought. The hay crop is especially excellent. Light frosts occurred on several dates, and a little damage was reported from New Hampshire on the 19th.

The following is an extract from the "Tennessee State Board of Health Bulletin," for June, 1886, prepared under the direction of J. D. Plunkett, M. D., President of the State Board of Health. The weather report is prepared by Major H. C. Bate, in charge of the State Meteorological Service:

The principal meteorological feature of June was the great and almost unprecedented amount of precipitation.

The mean temperature was 71°.54, about two and a half degrees below that for June of last year, and slightly below the means for June of the two previous years. The highest temperature was 93°, recorded on the 1st, and was 5° below the maximum recorded in June of last year, which was respectively 1° and 3° above the maximum points reached in June, 1883 and 1884. The lowest temperature was 48°, recorded on the 19th, and was 4° below the minimum of June, 1885, and 1° above that of the corresponding period of the two years previous. The monthly range of temperature was 45°, respectively 5°, 3°, and 1° less than the monthly ranges of June of the three preceding years, beginning with 1883.

The mean precipitation for the month was 7.24 inches, being at least three inches in excess of the normal mean for the month. Of this amount the eastern division received an average of about seven and one-third inches, the middle division received a little over seven inches, and the western division received nearly seven and a half inches. The greatest monthly rainfall was 12.20 inches, reported at Greeneville. Nearly half of this amount fell on one day, the 28th, when 5.10 inches was recorded. This was the greatest local daily rainfall during the month, and it is worthy of note that the greatest local daily fall during May occurred at the the same station and on the corresponding day of the month.

There were other very heavy local rainfalls during the month, notably at Savannah on the 2d, 2.41 inches; Nashville, 3d, 2.03 inches; Memphis, 13th, 2.79 inches; Hohenwald, 14th, 2.36 inches, also on the 20th, 2.30 inches; Bolivar, 16th, 3.72 inches (which amount the observer says fell in thirty-five minutes); Covington, 16th, 2.63 inches; Waynesborough, 17th, 2.20 inches, also on the 20th, 4.75 inches; Fostoria, 21st, 2.00 inches; Riddleton, 27th, 2.51 inches, and at Greeneville, 29th, 2.60 inches. Several other heavy local rains were reported, ranging from an inch and a half to nearly two inches. In addition to the greatest monthly fall at Greeneville, there were heavy monthly falls at Waynesborough, 11.53 inches; at Hohenwald, 10.34 inches; at Savannah, 11.14 inches, and at Riddleton, 9.52 inches. Many of the rains were general and some were the heaviest known in the localities where they occurred. But few of these rains were attended with very violent electrical disturbances and none with very high winds. The month, taken altogether, was literally a month of rains, as only one day, the 11th, was reported without some precipitation in some portion of the state. The percentage of cloudiness was largely in excess of the normal, considering this, the number of dews reported was unusually large, twenty-three being reported in various portions of the state, and on all days except the 3d, 7th, 14th, 16th, 17th, 21st, and 22d.

State summary.

Mean temperature, 71°5; highest temperature, 93°, on the 1st, at Memphis; lowest temperature, 48°, on the 19th, at Farmingdale; range of temperature, 45°; mean monthly range of temperature, 31°.86; greatest monthly range of temperature, 42°, at Farmingdale; least monthly range of temperature, 23°, at Covington; mean daily range of temperature, 13°.5; greatest daily range of temperature, 35°, on the 7th, at Sailor's Rest; least daily range of temperature, 2°, on the 3d, at Trenton, on the 8th, at Careyville and Ashwood, on the 14th, at Florence Station, on the 16th, at Hurricane Switch, and on the 20th, at Parksville; mean of maximum temperatures, 89°.36; mean of minimum temperatures, 57°.5.

Mean depth of rainfall, 7.24 inches; mean daily rainfall, 0.241 inch; greatest rainfall, 12.20 inches, at Greeneville; least rainfall, 4.14 inches, at Trenton; greatest local daily rainfall, 5.10 inches, on the 28th, at Greeneville; days of greatest rainfall, 2d, 7th, 8th, 13th, 14th, 15th, 16th, 17th, 20th; day of greatest, 17th.

Average number of days on which rain fell, 15.8; average number of clear days, 5.9; average number of fair days, 9.8; average number of cloudy days, 14.3.

Days without rainfall, 11th, 18th.

Warmest days, 1st, 12th; coldest days, 5th, 19th.

Prevailing winds, south and southwest.

The following is from the June, 1886, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

The month of June was, in most respects, a month of normal conditions, and one generally favorable to the growth of crops. The temperature was almost exactly the average of the past eight Junes, though less than usual of extremely hot days. The rainfall was slightly deficient, but more evenly distributed through the month than usual. There were few severe storms.

Observer S. S. Kauffman, of Stromsburg, reports the heaviest rain ever known on the 14th, with a strong wind and some hail, but no great damage done; but at Osceola both rain and hail did considerable damage.

D. P. Nicholson reports one of the heaviest rains of the season at York on the 6th.

Comparison of past Junes.

The table shows the mean temperature, the noon temperature, and the number of days above 85° for the past nine Junes in southeastern Nebraska; they are found by averaging the numbers reported at the different stations. It also shows the highest temperatures and the lowest recorded anywhere in the state by standard self-registering thermometers:

June.	Mean temperature.	Noon temperature.	Above 85°.	Highest temperature.	Lowest temperature.
	°	°		°	°
1878	66.7	77.8	8.5	—	—
1879	69.9	81.0	11.4	92	49
1880	73.4	81.1	11.6	97	46
1881	74.1	82.8	12.4	95	58
1882	72.2	79.5	11.4	93.1	45.7
1883	69.4	77.8	3.6	90	42
1884	71.9	81.7	14.2	94	44.8
1885	65.8	78.8	9.0	93.8	42.8
1886	70.0	80.3	8.7	80.1	33

The average rain for the different sections of the state for June, 1886, is as follows: northeast section (one station), 2.30 inches; north-middle (no station), ——; west (one station), 2.66; south-middle (two stations), 2.31; southeast (covering essentially what has heretofore been the "whole state" as far as reporting), 4.22 inches; state average by sections, 2.87.

The following table shows the precipitation, or depth in inches of rain and melted snow or hail, the number of days on which it fell, and the number of cloudy and of clear days. Days are counted cloudy when the sky is four-fifths overcast; clear when less than one-third. The last column shows the number of thunder-storms:

June.	Precipitation.	Days of precipitation.	Cloudy days.	Clear days.	Thunder.
	Inches.				
1878	5.98	8.2	4	12.7	4.6
1879	4.94	8.2	3.1	14.1	5.6
1880	5.27	7.1	3.6	12.9	6.5
1881	5.18	8.1	1.6	12.3	8.8
1882	5.24	10.5	5.8	8.6	10.3
1883	9.44	11.2	3.7	13	9
1884	2.48	5.9	2.7	11.3	6.7
1885	2.77	6	4.2	13.4	5.8
1886	4.22	8.9	1.9	15	5.2

The following is from the June, 1886, report of the "Ohio Meteorological Bureau," under direction of Prof. B. F. Thomas, of the Ohio State University, Columbus:

The meteorological record of Ohio for June, 1886, is marked by low barometric pressure, low temperature, and low daily average of temperature, with westerly winds and small rainfall. The mean temperature was 67°.5, the lowest mean for four years, 1°.2 below the average for that period, and 2°.9 below the normal. The highest temperature recorded was 97°.5, on the 14th;

lowest, 34°.0, on the 4th. The mean daily range of temperature was 20°.8, the average for four years being 22°.1.

The average rainfall was 3.53 inches, 0.24 inch less than the four year average, and 0.49 inch less than the normal. The greatest rainfall was recorded at Hanging Rock, 8,44 inches, and the least at Cleveland, 1.01 inches. General rains fell on the 2d and 9th, 13th to 17th, and 20th to 25th.

Summary.

Mean temperature, 67°.5; highest temperature, 97°.5, on the 14th, at Ohio State University; lowest temperature, 34°.0, on the 4th, at Paulding; range of temperature, 53°.5; mean daily range of temperature, 20°.8; greatest daily range of temperature, 44°.6, on the 12th, at Wauseon; least daily range of temperature, 4°.6, on the 27th, at Cincinnati; number of clear days, 10.5; fair days, 11; cloudy days, 8.5; days on which rain fell, 10.9; greatest number of days on which rain fell, 16, at Pomeroy; least number of days on which rain fell, 6, at Troy; mean rainfall, 3.53 inches; average daily rainfall, 0.12 inch.

Prevailing direction of wind, west.